Operating Instructions

Capactive high temperature probe for level detection

VEGACAP 67

- two-wire

Document ID: 31317

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Supplementary documentation

Information:
Supplementary documents appropriate to the ordered version come with the delivery. You can find them listed in chapter "*Product description*".

Instructions manuals for accessories and replacement parts

Tip:
To ensure reliable setup and operation of your VEGACAP 67, we offer accessories and replacement parts. The corresponding documentations are:

- 30174 - Electronics module VEGACAP series 60
- 34296 - Protective cover
- 31088 - Flanges according to DIN-EN-ASME-JIS-GOST

Editing status: 2013-08-21

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1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained specialist personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

Caution: If this warning is ignored, faults or malfunctions can result.

Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.

Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

Ex applications
This symbol indicates special instructions for Ex applications.

- **List**
  The dot set in front indicates a list with no implied sequence.

→ **Action**
This arrow indicates a single action.

1 **Sequence of actions**
Numbers set in front indicate successive steps in a procedure.

Battery disposal
This symbol indicates special information about the disposal of batteries and accumulators.

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2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protective equipment must always be worn.

2.2 Appropriate use

The VEGACAP 67 is a sensor for point level detection.

You can find detailed information on the application range in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

2.3 Warning about incorrect use

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

The safety approval markings and safety tips on the device must also be observed.

2.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

2.6 CE conformity

This device fulfills the legal requirements of the applicable EC guidelines. By attaching the CE mark, VEGA provides a confirmation of successful testing. You can find the CE conformity declaration in the download area of "www.vega.com".

2.7 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

2.8 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfill this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGACAP 67 point level switch
- Documentation
  - this operating instructions manual
  - Supplementary instructions manual "*Plug connector for level sensors*" (optional)
  - Ex-specific "*Safety instructions*" (with Ex versions)
  - if necessary, further certificates

Constituent parts

The VEGACAP 67 consists of the components:

- Housing cover
- Housing with electronics
- Process fitting with electrode

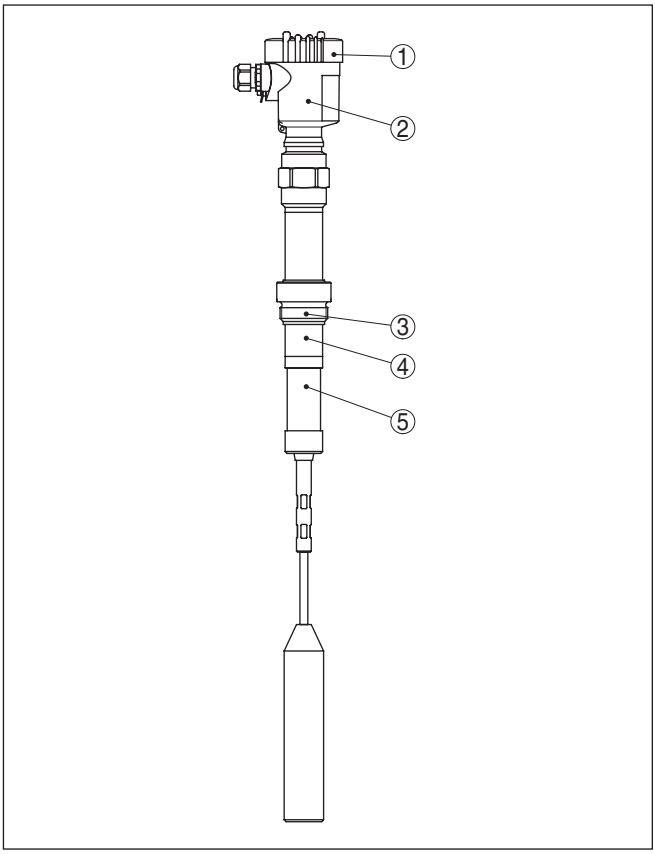

Fig. 1: VEGACAP 67 - with plastic housing

1 Housing cover
2 Housing with electronics
3 Process fitting
4 Supporting tube
5 Ceramic insulator

Type plate

The nameplate contains the most important data for identification and use of the instrument:

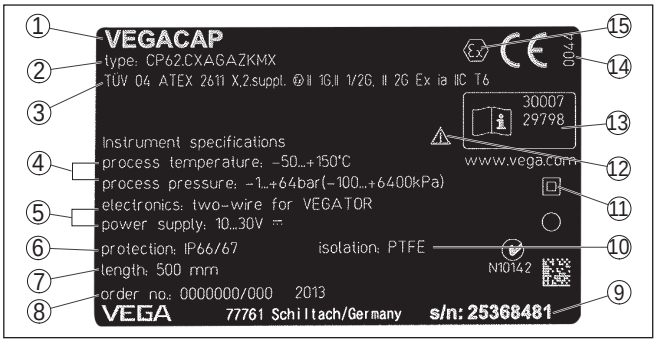

Fig. 2: Layout of the type label (example)

1 *Instrument type*
2 *Product code*
3 *Approvals*
4 *Process and ambient temperature, process pressure*
5 *Power supply and signal output, electronics*
6 *Protection rating*
7 *Probe length*
8 *Order number*
9 *Serial number of the instrument*
10 *Material, wetted parts*
11 *Symbol of the device protection class*
12 *Reminder to observe the instrument documentation*
13 *ID numbers, instrument documentation*
14 *Notified authority for CE marking*
15 *Approval directives*

With the serial number, you can access the delivery data of the instrument via www.vega.com, "*VEGA Tools*" and "*serial number search*". In addition to the type label outside, you can also find the serial number on the inside of the instrument.

3.2 Principle of operation

Area of application

VEGACAP 67 is a point level sensor with capacitive probe for level detection under high process temperatures.

VEGACAP 67 is very rugged and maintenance-free and can be used in all areas of industrial process technology.

Probes such as VEGACAP 67 are used in solids applications.

The range of the process temperature is at -50 … +300 °C (-58 … +572 °F). With external housing of -50 … +400 °C (-58 … +752 °F).

Typical applications are overfill and dry run protection.

The capacitive measuring principle places no special requirements on installation. Hence, many different applications can be equipped with VEGACAP 67.

Functional principle

Probe, measured product and vessel wall form an electrical capacitor. The capacitance is influenced by three main factors.

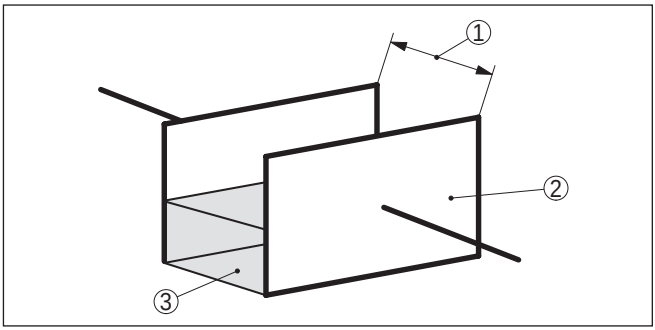

Fig. 3: Functional principle - Plate capacitor

1 Distance between the electrode surfaces
2 Size of the electrode surfaces
3 Type of dielectric between the electrodes

The probe and the vessel wall are the capacitor plates. The measured product is the dielectric. Due to the higher dielectric constant of the product compared to air, the capacitance increases as the probe is gradually covered.

The capacitance change is converted by the electronics module into a switching command.

Voltage supply

Depending on your requirements, VEGACAP 67 with two-wire electronics can be connected to different signal conditioning instruments. Compatible signal conditioning instruments are listed in chapter "*Technical data*".

The data for power supply are specified in chapter "*Technical data*".

3.3 Operation

The probe can be adapted to the dielectric constant of the product directly on the electronics module.

A switching command can be triggered when the probe is covered or laid bare.

On the electronics module you will find the following display and adjustment elements:

- Control lamp for indication of the device status.

3.4 Storage and transport

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Transport

Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 … 85 %

3.5 Accessories and replacement parts

Protective cap

The protective cover protects the sensor housing against soiling and intense heat from solar radiation.

You will find additional information in the supplementary instructions manual "*Protective cover*" (Document-ID 34296).

Flanges

Screwed flanges are available in different versions according to the following standards: DIN 2501, EN 1092-1, BS 10, ANSI B 16.5, JIS B 2210-1984, GOST 12821-80.

You can find additional information in the supplementary instructions manual "*Flanges according to DIN-EN-ASME-JIS*" (Document-ID 31088).

4 Mounting

4.1 General instructions

Suitability for the process conditions

Make sure that all parts of the instrument coming in direct contact with the process, especially the sensor element, process seal and process fitting, are suitable for the existing process conditions, such as process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" and on the nameplate.

Switching point

In general, VEGACAP 67 must be mounted vertically. The instrument must be mounted in such a way that the probe is at the height of the requested switching point.

Welding work

Before beginning the welding work, remove the electronics module from the sensor. By doing this, you avoid damage to the electronics through inductive coupling.

Handling

With threaded versions, the housing must not be used to screw in the instrument. Applying tightening forces on the housing can damage its internal parts.

Use the hexagon for screwing in.

Moisture

Use the recommended cables (see chapter "*Connecting to power supply*") and tighten the cable gland.

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

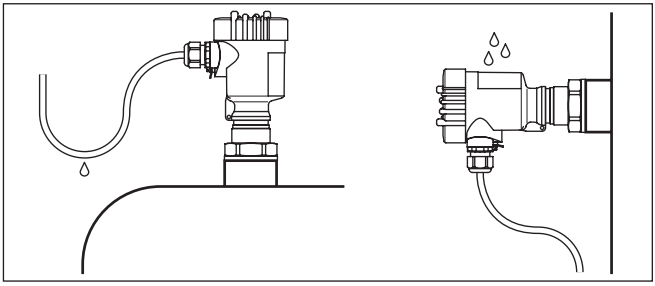

Fig. 4: Measures against moisture penetration

Pressure/Vacuum

The process fitting must be sealed if there is gauge or low pressure in the vessel. Before use, check if the seal material is resistant against the measured product and the process temperature.

The max. permissible pressure is specified in chapter "*Technical data*" or on the type label of the sensor.

4.2 Mounting instructions

Agitators and fluidization

Due to the effects of agitators, equipment vibration or similar, the level switch can be subjected to strong lateral forces. For this reason, do not use an overly long electrode for VEGACAP 67, but check if you can mount a short level switch on the side of the vessel in horizontal position.

Inflowing medium

If the instrument is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount the instrument at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

This applies particularly to instrument versions with a longer probe.

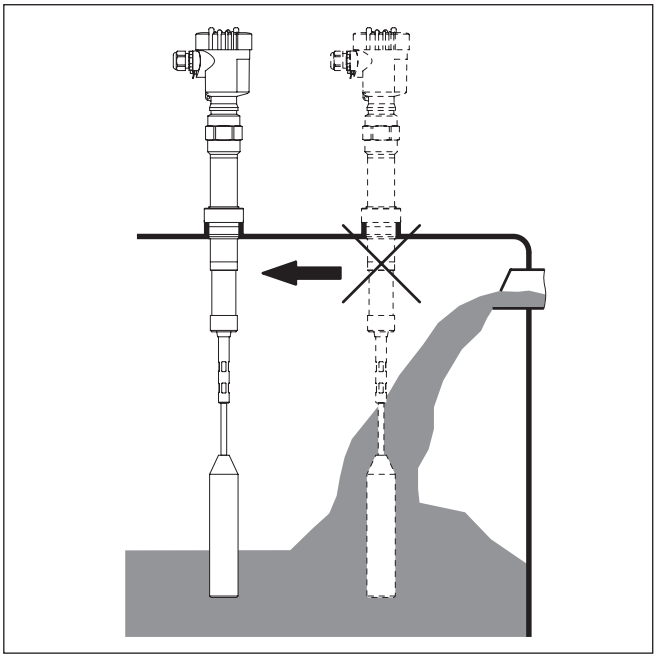

Fig. 5: Inflowing medium

Socket

The probe should protrude into the vessel to avoid buildup. For that reason, avoid using mounting bosses for flanges and screwed fittings. This applies particularly to use with adhesive products.

Material cone

In silos with bulk solids, material cones can form which change the switching point. Please keep this in mind when installing the sensor in the vessel. We recommend selecting an installation location where the probe detects the average value of the material cone.

The probe must be mounted in a way that takes the arrangement of the filling and emptying apertures into account.

To compensate measurement errors caused by the material cone in cylindrical vessels, the sensor must be mounted at a distance of d/6 from the vessel wall.

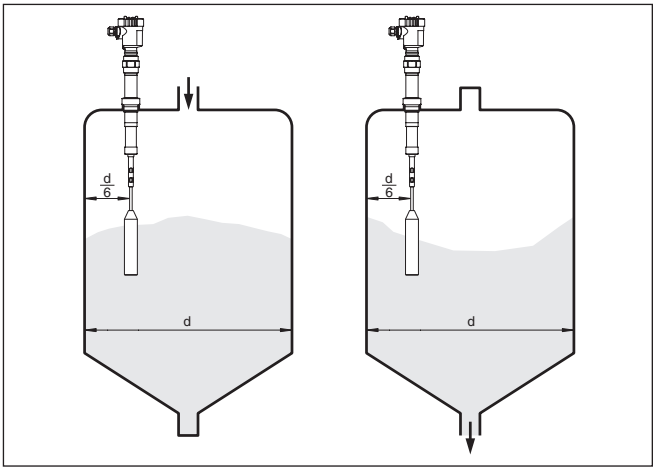

Fig. 6: Filling and emptying centred

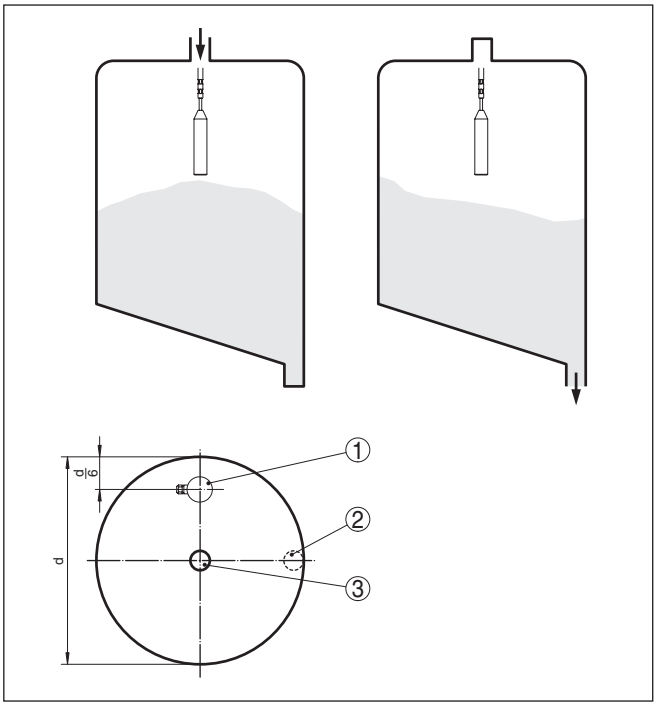

Fig. 7: Filling in the centre, emptying laterally

1 VEGACAP 67
2 Discharge opening
3 Filling opening

Tensile load

Make sure that the max. permissible tensile load of the suspension cable is not exceeded. The danger of this happening exists particularly with very heavy solids and large meas. lengths. The max. permissible load is stated in chapter "*Technical data*".

5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage

Take note of safety instructions for Ex applications

In hazardous areas you must take note of the respective regulations, conformity and type approval certificates of the sensors and power supply units.

Voltage supply

Connect the operating voltage according to the following diagrams. Take note of the general installation regulations. As a rule, connect VEGACAP 67 to vessel ground (PA), or in case of plastic vessels, to the next ground potential. On the side of the instrument housing there is a ground terminal between the cable entries. This connection serves to drain off electrostatic charges. In Ex applications, the installation regulations for hazardous areas must be given priority.

The data for power supply are specified in chapter "*Technical data*".

Connection cable

The instrument is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use cable with round cross-section. A cable outer diameter of 5 … 9 mm (0.2 … 0.35 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

In hazardous areas, only use approved cable connections for VEGACAP 67.

Connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications.

5.2 Connection procedure

With Ex instruments, the housing cover may only be opened if there is no explosive atmosphere present.

Proceed as follows:

1. Unscrew the housing cover
2. Loosen compression nut of the cable entry
3. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
4. Insert the cable into the sensor through the cable entry
5. Lift the opening levers of the terminals with a screwdriver (see following illustration)

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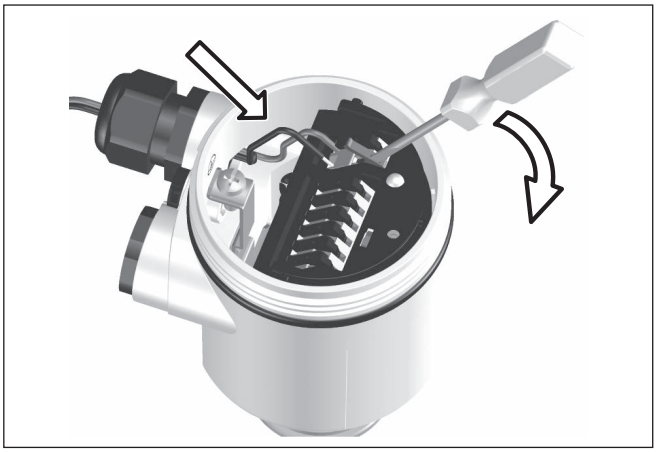

Fig. 8: Connection steps 5 and 6

6. Insert the wire ends into the open terminals according to the wiring plan
7. Press down the opening levers of the terminals, you will hear the terminal spring closing
8. Check the hold of the wires in the terminals by lightly pulling on them
9. Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable
10. If necessary, carry out a fresh adjustment
11. Screw the housing cover back on

The electrical connection is hence finished.

5.3 Wiring plan, single chamber housing

Housing overview

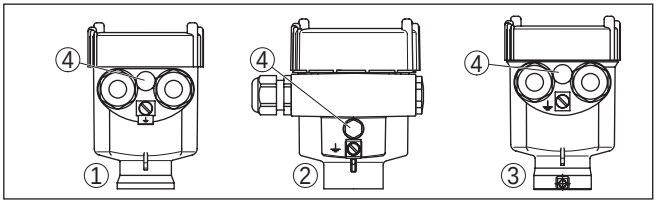

Fig. 9: Material versions, single chamber housing

1 Plastic (not with dust-Ex)
2 Aluminium
3 Stainless steel
4 Filter element for pressure compensation or blind plug with version IP 66/ IP 68, 1 bar

Electronics and connection compartment

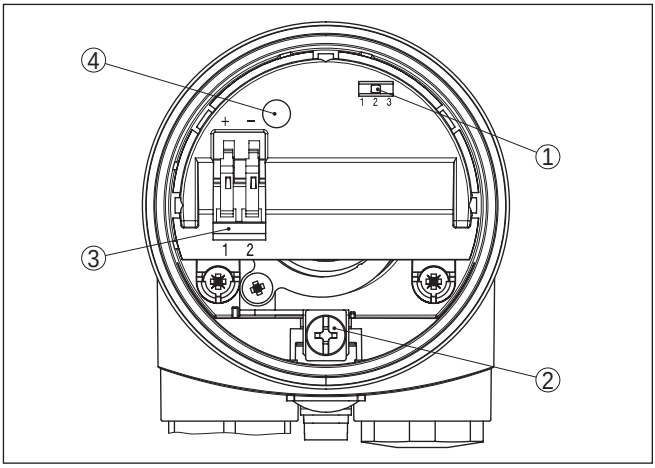

Fig. 10: Electronics and connection compartment

1 DIL switch for measuring range selection
2 Ground terminal
3 Connection terminals
4 Control lamp

Wiring plan

For connection to a signal conditioning instrument. The sensor is powered by the connected signal conditioning instrument. Further information is available in chapter "*Technical data*", "*Ex-technical data*" are available in the "*Safety information*".

The wiring example is applicable for all suitable signal conditioning instruments.

Take note of the operating instructions manual of the signal conditioning instrument. Suitable signal conditioning instruments are listed in chapter "*Technical data*".

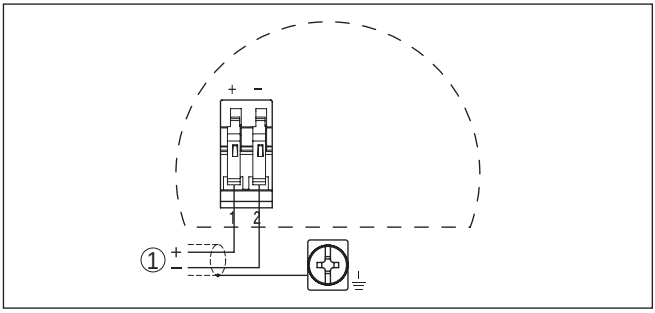

Fig. 11: Wiring plan

1 Voltage supply

5.4 Wiring plan - version IP 66/IP 68, 1 bar

Wire assignment, connection cable

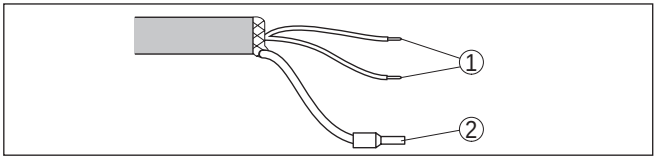

Fig. 12: Wire assignment, connection cable

1 brown (+) and blue (-) to power supply or to the processing system
2 Shielding

5.5 Warm-up reaction

After connecting to voltage supply or after a voltage recurrence, the instrument passes a certain switch on routine.

By lowering the current value when switching on, the instrument can output briefly a fault message.

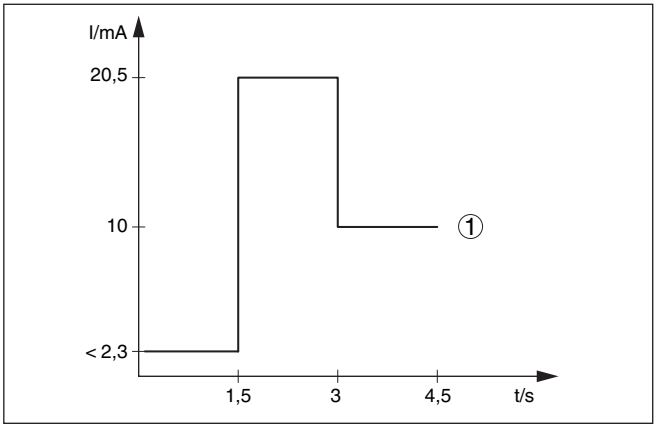

Fig. 13: Warm-up reaction

1 Measured value

6 Setup

6.1 General information

The figures in brackets refer to the following illustrations.

Function/Configuration

On the electronics module you will find the following display and adjustment elements:

- DIL switch for measuring range selection
- Control lamp

Note:
As a rule, always set the mode with the mode switch of the signal conditioning instrument before starting setup VEGACAP 67. The switching output will change if you set the mode switch afterwards. This could possibly trigger other connected instruments or devices.

6.2 Adjustment elements

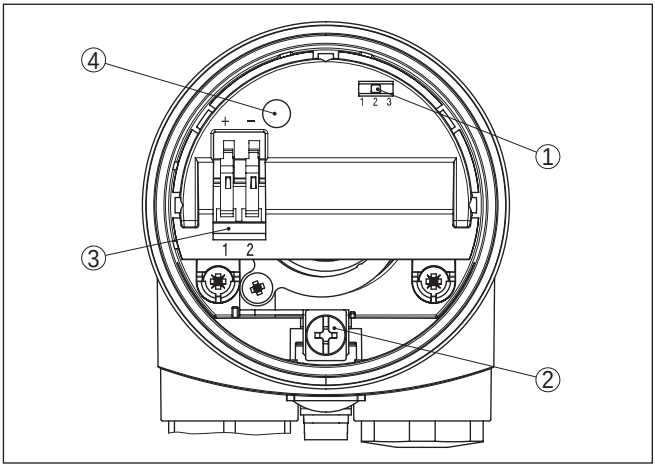

Fig. 14: Electronics module - Two-wire output

1 DIL switch for measuring range selection (with compensation button)
2 Ground terminal
3 Connection terminals
4 Control lamp

A failure can be displayed with closed housing (only plastic housing), see operating instructions manual of the "*Signal conditioning instrument*".

Note:
Screw the housing cover tightly up to the thread stop so that the inspection glass is above the control lamp (LED).

To adjust VEGACAP 67, first of all remove the housing cover.

Measuring range selection switch (1)

With the potentiometer on the signal conditioning instrument and the measuring range selection switch (1) on VEGACAP 67 you can

change the sensitivity of the probe to the electrical properties of the product and the conditions in the vessel. This is necessary so that the level switch can also reliably detect products e.g. with very low or very high dielectric figure.

range 1: 0 … 20 pF

Range 2: 0 … 85 pF

Range 3: 0 … 450 pF

Signal lamp (4)

Control lamp for indication of the device status.

- green = instrument functions
- red (flashing) = failure

See operating instructions manual of the "*Signal conditioning instrument*".

Switching point adjustment

The adjustment of the switching point is only possible in installed condition.

The detailed adjustment of VEGACAP 67 is described in the operating instructions manual of the "*Signal conditioning instrument*".

7 Maintenance and fault rectification

7.1 Maintenance

If the instrument is used properly, no special maintenance is required in normal operation.

7.2 Rectify faults

Reaction when malfunctions occur

The operator of the system is responsible for taking suitable measures to rectify faults.

Failure reasons

VEGACAP 67 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measure to be taken is to check the output signal. In many cases, the causes can be determined this way and the faults rectified.

24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is available to you 7 days a week round-the-clock. Since we offer this service world-wide, the support is only available in the English language. The service is free of charge, only the standard telephone costs will be charged.

Checking the switching signal

Error	Cause	Rectification
– The instrument signals covered without covering with the medium – The instrument signals covered with covering with the medium	Wrong mode selected on the signal conditioning instrument	Set the correct mode on the mode switch of the signal conditioning instrument (A: overflow protection, B: dry run protection). Wiring should be carried out according to the quiescent current principle.
	Operating voltage too low	Check operating voltage
	Shortcircuit in the probe, e.g. because of moisture in the housing	Remove the electronics module. Check the resistance between the marked plug connections. See the following instructions.
	Electronics defective	Push the mode switch (A/B) on the signal conditioning instrument. If the signal conditioning instrument then changes the mode, the probe may be mechanically damaged. Should the switching function in the correct mode still be faulty, return the probe for repair. Check if there is buildup on the probe, and if so, remove it.
	Unfavourable installation location	Check if the probe is covered by buildup on the socket. Mount the instrument at a location in the vessel where e.g. no mounds can form.
Signal lamp flashes red	Electronics module has detected a failure	Exchange the instrument or send it in for repair

Check the resistance in the probe

Remove the electronics module. Check the resistance between the two plug connections.

There must no longer be a connection (high impedance). If there is still a connection - exchange the instrument or return it for repair

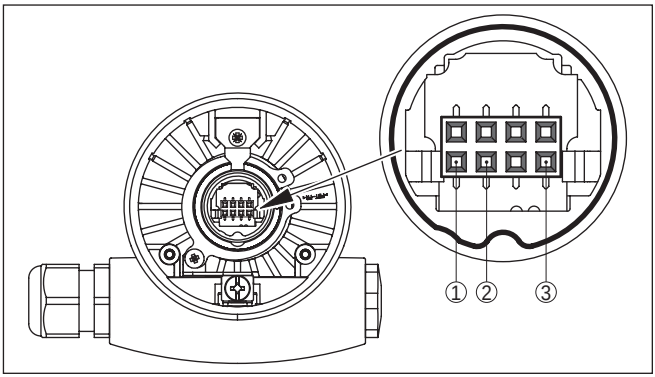

Fig. 15: Check the resistance in the probe

1 Shielding
2 Probe
3 Ground potential

Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "*Set up*" may have to be carried out again.

7.3 Exchange of the electronics module

In general, all electronics modules of series CP60 can be interchanged. If you want to use an electronics module with a different signal output, you can download the corresponding operating instructions manual from our homepage under Downloads.

Proceed as follows:

1. Switch off power supply
2. Unscrew the housing cover
3. Lift the opening levers of the terminals with a screwdriver
4. Pull the connection cables out of the terminals
5. Loosen the two screws with a screw driver (Torx size T10 or slot 4)

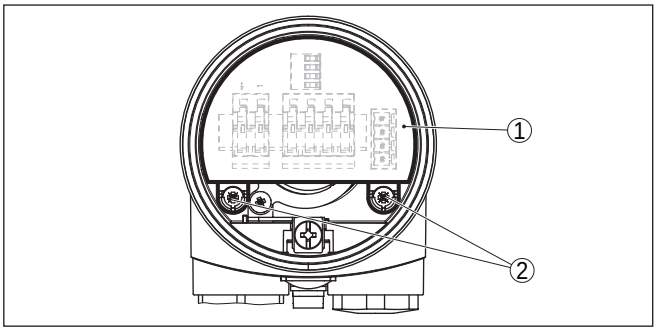

Fig. 16: Loosening the holding screws

1 Electronics module
2 Screws (2 pcs.)

6. Pull out the old electronics module
7. Compare the new electronics module with the old one. The type label of the electronics module must correspond to that of the old electronics module. This applies particularly to instruments used in hazardous areas.
8. Compare the settings of the two electronics modules. Set the adjustment elements of the new electronics module to the same setting of the old one.

Information:
Make sure that the housing is not rotated during the electronics exchange. Otherwise the plug may be in a different position later.

9. Insert the electronics module carefully. Make sure that the plug is in the correct position.
10. Screw in and tighten the two holding screws with a screwdriver (Torx size T10 or Phillips 4)
11. Insert the wire ends into the open terminals according to the wiring plan
12. Press down the opening levers of the terminals, you will hear the terminal spring closing
13. Check the hold of the wires in the terminals by lightly pulling on them
14. Check cable gland on tightness. The seal ring must completely encircle the cable.
15. Mount the probe into the vessel. Make sure that the probe is uncovered.

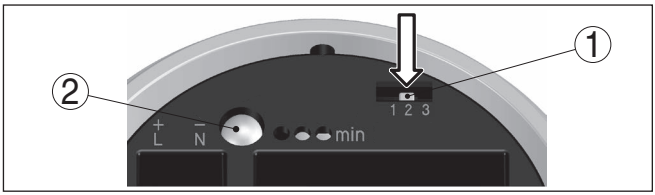

Fig. 17: Compensation key

1 Measuring range selection switch (compensation key)
2 Control lamp

16. Keep the measuring range selection switch (1) pushed until the control lamp (2) flashes green.
17. Carry out the adjustment again. See chapter "*Set-up, adjustment elements*".
18. Screw the housing cover back on

The electronics exchange is now finished.

7.4 Shortening of the probe

The rod of the probe can be shortened to any length.

1. Shorten the rod probe to the requested length with a metal saw.
2. Mount the probe into the vessel. Make sure that the probe is uncovered.

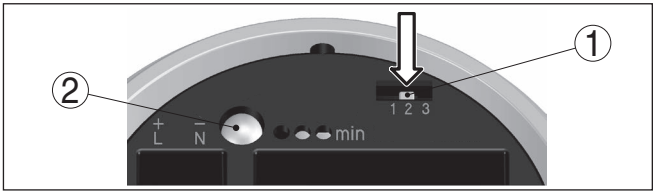

Fig. 18: Compensation key

1 Measuring range selection switch (compensation key)
2 Control lamp

3. Keep the measuring range selection switch (1) pushed until the control lamp (2) flashes green.
4. Hence the probe is compensated to the modified length.
5. Carry out the adjustment again. See chapter "*Set-up, adjustment elements*".

7.5 How to proceed in case of repair

You can find a repair form as well as detailed information on how to proceed under www.vega.com/downloads and "*Forms and certificates*".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

If a repair is necessary, please proceed as follows:

- Print and fill out one form per instrument

- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please contact for the return shipment the agency serving you. You can find the agency on our home page www.vega.com.

8 Dismounting

8.1 Dismounting steps

Warning:
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

With Ex instruments, the housing cover may only be opened if there is no explosive atmosphere present.

8.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the parts to be easily separable.

WEEE directive 2002/96/EG
This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

9 Supplement

9.1 Technical data

General data

Material 316L corresponds to 1.4404 or 1.4435	
Process fitting	G1½ A, 1½ NPT
Materials, wetted parts	
– Process fitting - thread	316L
– Process fitting - flange	316L
– Process seal	Klingersil C-4400
– insulation (partly insulated)	Ceramic (KER 221 according to DIN 40685)
– Probe - rod, ceramic partly insulated (ø 15 mm/0.591 in)	316L
– Probe - cable, ceramic partly insulated (ø 8 mm/0.315 in)[1]	316 (1.4401)
– Gravity weight	316L
Materials, non-wetted parts	
– Plastic housing	plastic PBT (Polyester)
– Aluminium die-casting housing	Aluminium die-casting AlSi10Mg, powder-coated - basis: Polyester
– Stainless steel housing - precision casting	316L
– Stainless steel housing, electropolished	316L
– Seal between housing and housing cover	NBR (stainless steel housing, precision casting), silicone (aluminium/plastic housing; stainless steel housing, electropolished)
– Ground terminal	316L
Process fittings	
– Pipe thread, cylindrical (DIN 3852-A)	G1½ A
– American pipe thread, conical (ASME B1.20.1)	1½ NPT
– Flanges	DIN from DN 50, ANSI from 2"
Weight	
– Instrument weight (depending on process fitting)	0.8 … 4 kg (0.18 … 8.82 lbs)
– Gravity weight	1800 g (64 oz)
– Rod weight: ø 15 mm (0.591 in)	1400 g/m (15 oz/ft)
– Cable weight: ø 8 mm (0.315 in)	400 g/m (4.3 oz/ft)
Sensor length (L)	
– Rod (ø 15 mm/0.591 in)	0.275 … 6 m (0.902 … 19.69 ft)
– Cable (ø 8 mm/0.315 in)	0.5 … 40 m (1.64 … 131.23 ft)

[1] Cable connected electrically conductive with the gravity weight.

Supporting tube length L1	0.2 … 5.6 m (0.656 … 18.37 ft)
Max. lateral load	10 Nm (7.4 lbf ft)
Max. tensile load (cable)	
– Ceramic partly insulated: ø 8 mm (0.315 in)	10 KN (2248 lbf)
Max. torque (process fitting - thread)	80 Nm (58 lbf ft)
Measuring frequency	430 kHz

Output variable

Output	Two-wire output
Suitable signal conditioning instruments	VEGATOR 521, 527, 620, 621, 622
Output signal	> 4 … < 20 mA (not standardised)
Fault message	< 2.3 mA
Switching delay	
– When immersed	0.7 s
– When laid bare	0.7 s
– In case of failure	1 s

Ambient conditions

Ambient temperature on the housing	-40 … +80 °C (-40 … +176 °F)
Storage and transport temperature	-40 … +80 °C (-40 … +176 °F)

Process conditions

Process pressure	-1 … 16 bar/-100 … 1600 kPa (-14.5 … 232 psig)
Process temperature (thread or flange temperature)	
– Standard	-50 … +300 °C (-58 … +572 °F)
– with external housing	-50 … +400 °C (-58 … +752 °F)

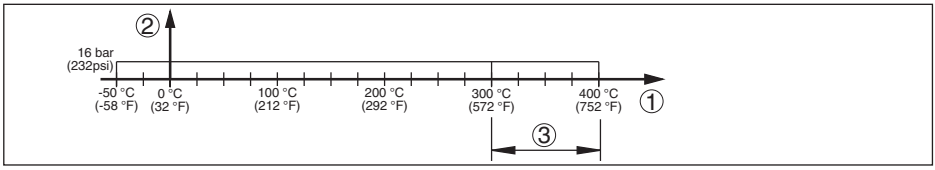

Fig. 19: Process temperature - Process pressure

1 Process temperature
2 Process pressure
3 Temperature range with external housing

Dielectric constant	≥ 1.5

Electromechanical data - version IP 66/IP 67 and IP 66/IP 68; 0.2 bar

Cable entry/plug[2)]

[2)] Depending on the version M12 x 1, according to ISO 4400, Harting, 7/8" FF.

– Single chamber housing	– 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind plug M20 x 1.5 or: – 1 x closing cap ½ NPT, 1 x blind plug ½ NPT or: – 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5
Spring-loaded terminals	for wire cross-section up to 1.5 mm² (AWG 16)

Electromechanical data - version IP 66/IP 68 (1 bar)

Cable entry	
– Single chamber housing	– 1 x IP 68 cable gland M20 x 1.5; 1 x blind plug M20 x 1.5 or: – 1 x closing cap ½ NPT, 1 x blind plug ½ NPT
Connection cable	
– Wire cross-section	> 0.5 mm² (AWG 20)
– Wire resistance	< 0.036 Ω/m (0.011 Ω/ft)
– Tensile strength	< 1200 N (270 lbf)
– Standard length	5 m (16.4 ft)
– Max. length	1000 m (3280 ft)
– Min. bending radius	25 mm (0.984 in) with 25 °C (77 °F)
– Diameter approx.	8 mm (0.315 in)
– Colour - standard PE	Black
– Colour - standard PUR	Blue
– Colour - Ex-version	Blue

Adjustment elements

DIL switch for measuring range selection	
– range 1	0 … 20 pF
– range 2	0 … 85 pF
– range 3	0 … 450 pF

Voltage supply

Operating voltage	10 … 36 V DC (via the signal conditioning instrument)

Electrical protective measures

Protection rating	
– Plastic housing	IP 66/IP 67
– Aluminium and stainless steel standard	IP 66/IP 68 (0.2 bar)[3)]
– Aluminium and stainless housing (optionally available)	IP 66/IP 68 (1 bar)
Overvoltage category	III

[3)] A suitable cable is the prerequisite for maintaining the protection rating.

Protection class	II

9.2 Dimensions

Housing in protection IP 66/IP 67 and IP 66/IP 68; 0.2 bar

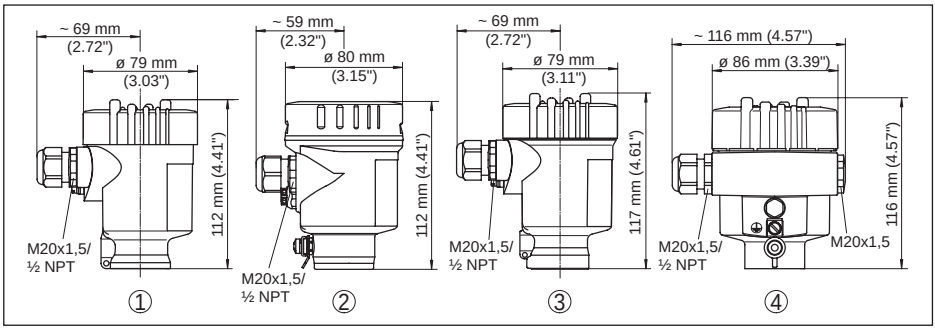

Fig. 20: Housing versions in protection IP 66/IP 67 and IP 66/IP 68; 0.2 bar

1 *Plastic housing*
2 *Stainless steel housing, electropolished*
3 *Stainless steel housing, precision casting*
4 *Aluminium housing*

Housing in protection IP 66/IP 68 (1 bar)

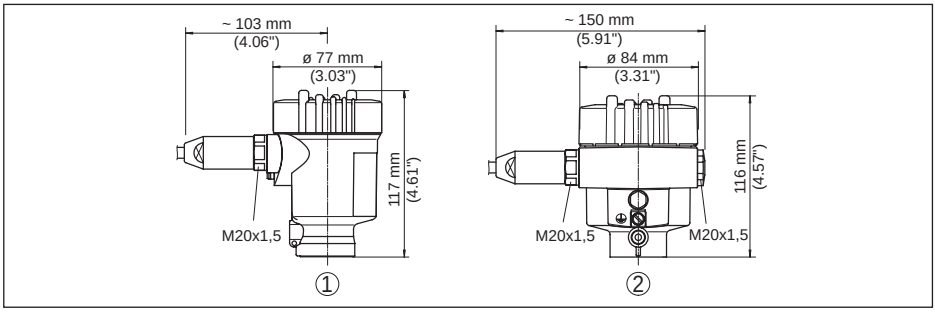

Fig. 21: Housing versions with protection rating IP 66/IP 68 (1 bar)

1 *Stainless steel housing, precision casting*
2 *Aluminium housing*

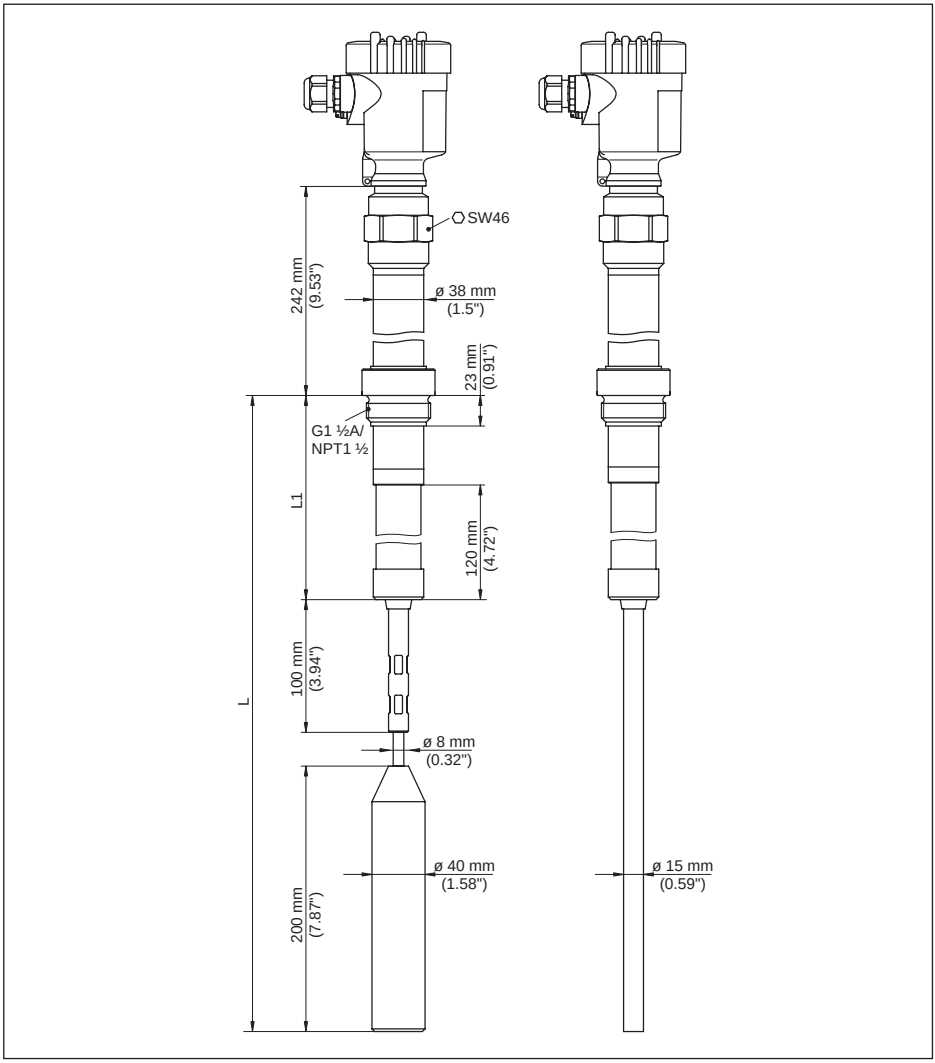

Fig. 22: VEGACAP 67, threaded version G1½ A (ISO 228 T1) and 1½ NPT, -50 … +300 °C (-58 … +572 °F)

Version -50 … +400 °C (-58 … +752 °F) only with external housing.
See supplementary instructions manual "External housing - VEGACAP, VEGACAL"

L Sensor length, see chapter "Technical data"

L1 Supporting tube length, see chapter "Technical data"

9.3 Industrial property rights

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All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.
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31317-EN-130916

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